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THE PLANT DISEASE REPORTER

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THE PLANT DISEASE SURVEY

Division of Mycology and Disease Survey

BUREAU OF PLANT INDUSTRY, SOILS, AND AGRICULTURAL ENGINEERING

AGRICULTURAL RESEARCH ADMINISTRATION

UNITED STATES DEPARTMENT OF AGRICULTURE

SUPPLEMENT 186

LOSSES FROM PLANT DISEASES: EFFECTS ON CROP INDUSTRIES AND ON FARM LIFE

Supplement 186

September 15, 1949



The Plant Disease Reporter is issued as a service to plant pathologists throughout the United States. It contains reports, summaries, observations, and comments submitted voluntarily by qualified observers. These reports often are in the form of suggestions, queries, and opinions, frequently purely tentative, offered for consideration or discussion rather than as matters of established fact. In accepting and publishing this material the Division of Mycology and Disease Survey serves merely as an informational clearing house. It does not assume responsibility for the subject matter.



PLANT DISEASE REPORTER SUPPLEMENT

Issued by

THE PLANT DISEASE SURVEY
DIVISION OF MYCOLOGY AND DISEASE SURVEY

Plant Industry Station

Beltsville, Maryland

LOSSES FROM PLANT DISEASES:

EFFECTS ON CROP INDUSTRIES AND ON FARM LIFE

Plant Disease Reporter
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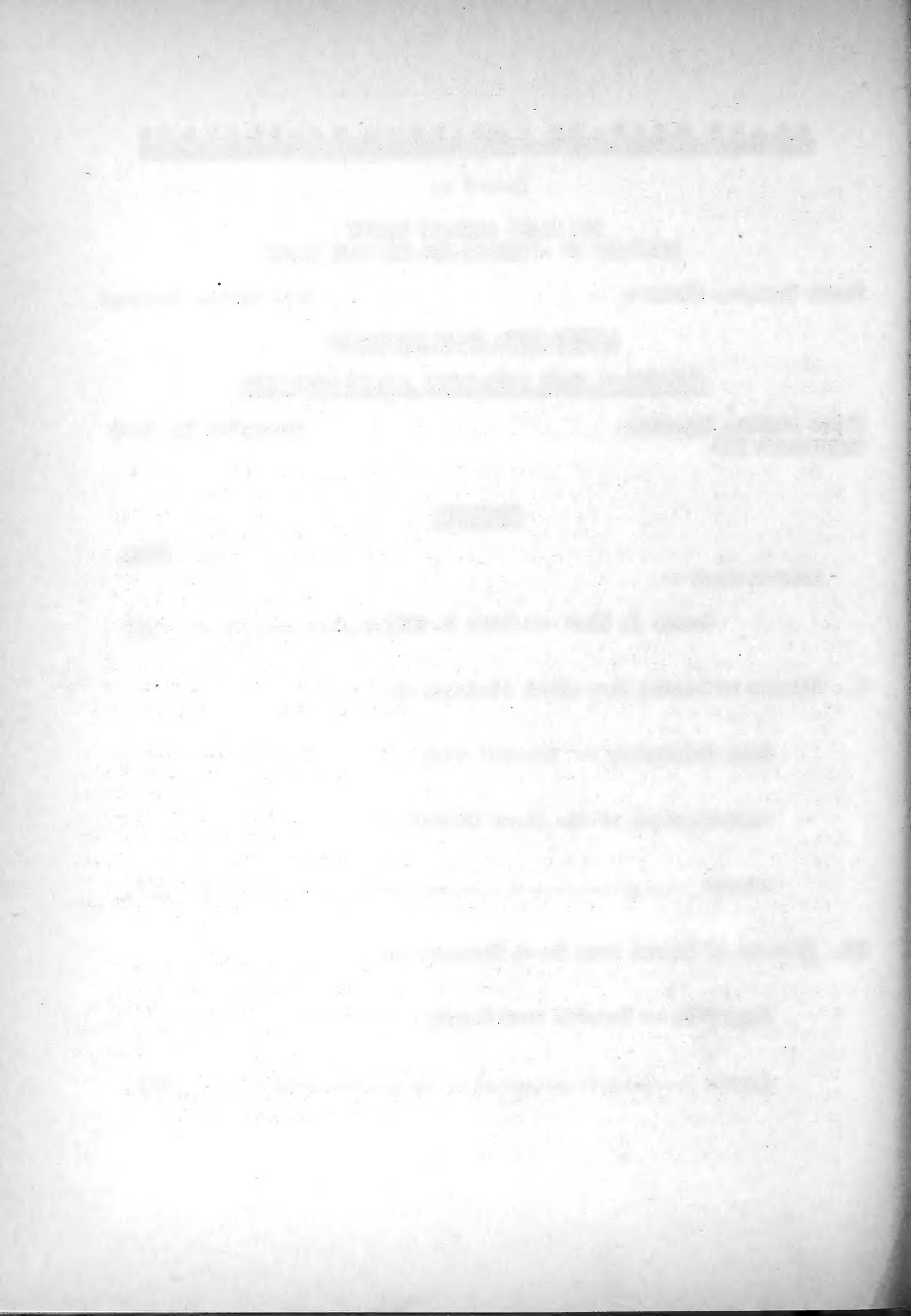
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LOSSES FROM PLANT DISEASES:EFFECTS ON CROP INDUSTRIES AND ON FARM LIFE

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INTRODUCTION

Jessie I. Wood and Paul R. Miller

When the late Dr. Neil E. Stevens was in charge of the Plant Disease Survey, he asked collaborators for illustrations of the failure of crop projects due to plant diseases. These were published, in part, in the Plant Disease Reporter (Vol. 18, no. 2, pp. 7-16. Mar. 15, 1934).

Dr. Stevens, along with other forward-looking plant pathologists, was concerned lest plant diseases be overlooked, among other more obvious and commonly recognized causes of risk, in the acreage adjustment and land utilization programs just being started at that time. The primary reason for his request was to accumulate "what might be called, disease hazard information" (letter, January 11, 1933) as a preliminary step in demonstrating that plant diseases should be taken into account and plant pathologists consulted in planning these programs. In his foreword in the Reporter, he stressed particularly the historical value of such records, their usefulness as a check on the practical significance of experimental findings, and the service they can render in avoiding "extraordinary disease hazards" in establishing new crop projects.

In the fifteen years that have gone by since the original request, many changes have taken place. Agricultural industries have shrunk or expanded, or moved to entirely new regions. New diseases have threatened established crops, and new crops have brought their own difficulties. Control methods have been developed to take care of some of the earlier problems. Accumulated knowledge about plant diseases has enabled pathologists and growers to check many incipient threats. Moreover, a very great advance is just now being made in the development of chemical controls.

Altogether, it seemed desirable to make a similar survey now. Accordingly, we asked our collaborators for information on changes in crop industries caused primarily by plant diseases, revival due to the development of disease control methods, and new disease problems accompanying the establishment of new crops or resulting from the introduction of new diseases. Later, at the suggestion of Dr. A. E. Dimond of the Connecticut Station we added another heading, more applicable to many situations, i. e., "instances where rapid diagnosis, lucky or

prophetic research, and efficient distribution of this information have prevented a new disease from assuming serious proportions."

Another aspect of the effects of plant disease losses, i. e., the extent to which they influence the work and lives of individual farm families, was the subject of an inquiry sent to some 425 County Agents throughout the country. Selection of counties was randomized by using a deck of cards, but some additions and substitutions were suggested by collaborators as better suited to the purpose of the study, so that the final list was partly random and partly selective.

The questionnaire included the following topics:

EFFECT OF PLANT DISEASES ON FARM LIFE*

1. Year when loss occurred (or period of years if loss was cumulative for several seasons):
2. Location (State, County, etc.) and size of farm:
3. Size compared with usual for area: Small -- average -- large
4. Was farmer the owner? How long had he operated this farm?
5. Quality of farming: Poor -- average -- good
6. Crop suffering loss and acreage planted to crop on this farm (see also No. 14):
7. Disease causing loss (how was it identified?):
8. Was the disease a common cause of trouble or was it new to the region?
9. Were any attempts made to control it? What were they?
10. Kind and extent of loss** (see also No. 14): (a) Percent of stand destroyed by or abandoned because of this disease. (b) Reduction in yield: Yield expected (bushels or other crop unit). Yield obtained. (c) Loss in storage: Bushels (or other units) stored. Bushels lost from this disease. (d) Other. (e) Loss expressed in money.
11. Effect of loss on farm management (ownership, machinery, crops grown, etc.):
12. Effect of loss on family life (education, standard of living, health, etc.).
13. Did the farmer recover from his loss? If so, how, and how long did it take?
14. Loss, including forced sale, of farm animals attributable to plant disease, as follows (give kind of animal, number owned, and number lost): (see also No. 6)** : (a) From failure of feed crops due to plant disease. (b) From feeding scabby grain. (c) From ergot in pastures.
15. Remarks

*We realize that in many cases cooperators will not be able to furnish all the information asked for; but we should like to have as much as possible.

**We have indicated methods of stating loss so as to make comparisons possible, but the nature of your material may make it necessary for you to use some other way.

Of the 185 replies received only those quoted below gave definite illustrations of more or less permanent effects of plant disease losses on the prospects of individual farm families. Many County Agents stated that in their counties crop diversification kept any one loss from being too important, or intelligent farming made prompt use of scientific findings and thus prevented loss, or disease loss was of minor importance in comparison with other factors. Some County Agents went to considerable trouble to verify their negative reports. We appreciate this particularly. It is drudgery to be definite and thorough in acquiring only negative information.

A second questionnaire, in tabular form, asked for information on farm mortgage foreclosures resulting from losses due to plant disease attacks. Practically all who responded to this questionnaire stated that no such instances had come to their attention. The few illustrations that were cited are combined with the reports below.

Replies to the question on loss of livestock from the effects of plant diseases were so few as to make their compilation not worth while.

Response to both inquiries follows, in two sections: first, the reports from collaborators on the effects of plant disease losses on crop industries; second, the reports from County Agents on the effects of plant disease losses on farm life. The Survey wishes to thank all those who have cooperated in this undertaking.

I. EFFECTS OF LOSSES FROM PLANT DISEASES ON CROP INDUSTRIES

Reports from Collaborators of the Plant Disease Survey

ALABAMA

By Coyt Wilson

Austrian winter peas were introduced to Alabama farmers about 1925-1930 as a winter legume for soil building purposes. Losses from Ascochyta blight became so heavy that most farmers have ceased to use them. Vetch is now being used in most areas where Austrian winter peas were grown a few years ago, and practically no Austrian winter pea seed are produced in the State.

Blue lupines became very popular as a winter legume in southern Alabama between 1940 and 1945. Two factors contributed to its popularity. It made rapid growth and could be ploughed under in February so that there was plenty of time to get the summer crop planted. The second reason was that seed could be produced locally. In the early spring of 1947 anthracnose made its appearance and caused heavy losses in lupines being grown for seed. No control methods have been developed and at the present seed production of lupines is declining in the extreme southern part of Alabama. In Baldwin County lupine acreage has decreased sharply, and it appears certain that this crop will not be planted to any extent in the future.

Fusarium wilt of cotton has forced the growers to use wilt resistant varieties.

Helminthosporium blight of oats has caused farmers in southern Alabama to avoid using varieties that come from any Victoria cross.

About 1940 there was considerable interest in barley as a grain crop in Alabama and the acreage increased sharply. Loose smut and Helminthosporium blight and root-rot became so serious that our present acreage is less than one-eighth of what it once was.

Concealed damage of runner peanuts became an important disease in Alabama when the new marketing regulations went into effect. Under these regulations the price is determined by the shelling percentage and by the amount of damage present. Thus, a sample with a shelling percentage of 65 percent containing 2 percent damage will bring less than another sample with a shelling percentage of 65 percent containing only 1 percent damage. Under the old system peanuts were sold as No. 1, No. 2., or No. 3, and small differences within a grade did not affect the price.

In the fall of 1944 this Experiment Station and the Experiment Station

in Georgia started the work of trying to determine the cause of concealed damage and the effect of environmental factors on its development. Within two years most of these details had been worked out. Fortunately, the Florida Experiment Station released the Dixie Runner peanut about that time; since our experiments had shown that it was highly resistant to concealed damage, we immediately recommended it. As a result concealed damage is not a serious factor with us now. -- ALABAMA POLYTECHNIC INSTITUTE, AUBURN

CALIFORNIA

By Wm. B. Hewitt

Milo Root Rot. After 1935 Milo root rot very rapidly became a limiting factor in the production of Milo in areas of California. This was particularly so in the Delta of the Sacramento River where root rot was first recognized in 1935. By 1938, most of the plantings were infested and losses varied from only a trace in some plantings to 100 percent in many others.

Acreage estimates in thousands of acres of Milo harvested each year from 1935 to 1941 were as follows: 136, 114, 136, 136, 136, 99, 135, and 204. Yields in bushels per acre for the same period were respectively reported as 36, 36, 33, 34, 32, 36, 36. Since that time the yield has stayed above 36 bushels per acre except in 1944 when it was about 35.

The selection and development of resistance in varieties progressed very rapidly as the disease spread. So, by 1940, seed of these new selections, particularly Double Dwarf Milo 38, became generally available to growers.

Pierce's Disease of Grape. Between 1936 and 1941 approximately 3,500 acres of vineyard, mostly the variety Thompson seedless grown for raisin, were destroyed by Pierce's disease in the Chowchilla area in Madera County. Much of this land has since been planted to alfalfa, permanent pasture and annual crops such as cotton, grain, potatoes, etc. Dairying has been developing in this area for several years. The pattern for this change was therefore, established, but the disease certainly hastened the change of this acreage.

A change very similar to this has taken place between 1940 and 1947 in the area near Kerman, in Fresno County. Over these years many vineyards have been removed after Pierce's disease destroyed from 25 to 30 percent of the vines. Much of this land has been planted to alfalfa, cotton, milo, etc.

The disease alfalfa dwarf is caused by the same virus as Pierce's

disease of grape. Vectors which spread the virus in the Fresno area, particularly Draeculacephala minera, develop freely in the alfalfa plantings infested with dwarf which often suffer heavy loss.

Curly Top of Beets. Curly top was formerly the limiting factor in sugar beet production in several areas of California as well as in other western States.

Severe outbreaks occurred in 1899, 1900, 1905, 1914, 1919, and 1925. By 1930 resistant varieties of sugar beets were released and during the next few years the older varieties were almost completely replaced by improved resistant types. During the same period the beet sugar processing companies undertook direct control measures against the beet leaf hopper in its breeding areas.

As a result of these two developments, along with improved cultural practices, the sugar beet industry has revived and expanded.

In 1925, when curly top was so severe, the yield in California was only 6.5 tons per acre on 76,000 planted acres, and during the next five years the planted acreage averaged only 53,000 acres per year. By comparison the average planted acreage for the five years, 1938 to 1942, after resistant varieties were in general use, was 170,000 acres per year.

Similarly, the average yield of beets from 1918 to 1927, including two severe curly top outbreaks, was only 8.27 tons per acre, whereas from 1938 to 1947 the average yield was 16.01 tons per acre.

Much of the improvement in both yield and acreage is due to improved cultural practices and better selection of land, but without curly top control this remarkable revival of the industry would not have been possible.

Sclerotium Rot. By 1933 the attack of Sclerotium rolfsii upon sugar beets was so frequent and so severe in certain areas of the Sacramento Valley of California that it appeared doubtful that growers could continue to produce this crop. Following a careful study of the problem a number of control measures were introduced. These included: (1) checking the spread of the fungus by proper handling of screenings from sugar beet loading stations, of wash water from sugar factories, farm machinery and livestock from infested fields; (2) crop rotation with nonsusceptible or winter crops to prevent multiplication of the fungus; (3) indexing of fields to determine fungus populations as an aid in avoiding heavily infested fields; and (4) use of nitrogenous fertilizers to reduce infection.

As a result of these improved practices the losses from this disease have been reduced to a low level and sugar beet production has continued

in a proper rotation even in the most heavily infested areas.
UNIVERSITY OF CALIFORNIA, BERKELEY

CALIFORNIA

By H. Earl Thomas

Apricot and prune trees in the Santa Clara Valley killed by Armillaria (PDR 29: 495-6. 1945) are usually replaced by Persian walnut on Juglans hindsii root. Some of the latter will no doubt succumb after 8 to 15 years to the disease called black line.

The loganberry, a leading berry variety in Sonoma County 25 or 30 years ago, is virtually extinct due chiefly to a virus disease (Phytopath. 38:919. 1948).

Discovery of nematode resistant peach root and a cure for little leaf (zinc deficiency) has revived peach and almond growing in considerable areas of the San Joaquin Valley.

It is becoming difficult to find good land which has not grown tomato or cotton in recent years. These crops in some way build up Verticillium for succeeding crops. UNIVERSITY OF CALIFORNIA, BERKELEY

CONNECTICUT

By Albert E. Dimond

The information requested regarding crop industries which have been revived due to the development of disease control methods has, it seems to us, this fallacy which you may have already allowed for. In some sections of the country the growers are not organized into groups and do not present their point of view so rapidly to the Experiment Station that the research man can find the answers for them. Often they do not know what is wrong with their crops. In such instances there may be a considerable lag between the time a new disease appears in an area, and the time when a solution is found for the disease; and in such instances there will likely be a considerable reduction in the amount of the crop planted until the solution is found. The people who know the history of the situation best here can cite instances where rapid diagnosis, lucky or prophetic research, and efficient distribution of this information have prevented a new disease from assuming serious proportions.

Turning to the first category where changes in crop industries have been caused primarily by plant diseases, one might list the following, without particular attention to the importance of the several crops.

Rust on blackberries and raspberry mosaic have certainly reduced the

amount of cane fruits planted, whether the plantings be in backyard home gardens or on a commercial scale.

The white pine blister rust has eliminated the growing of black currants, and has seriously reduced the plantings of white pine.

Combined with a labor shortage, Diplocarpon and one disease which appears to be new to this area will seriously affect strawberry plantings if the growers do not heed the control procedures already worked out for them.

Another case where control is known but growers may reduce crop plantings because of failure to heed these control methods are peaches when attacked by X-disease. "Little peach" is gaining in incidence, and that may reduce peach plantings.

Dutch elm disease has certainly affected the sales of American elm by nurseries, and the plantings in turn by nurserymen.

Willow scab has in the past seriously affected the amount of willows sold.

Chrysanthemum nematode has been a great source of trouble and has affected the crop specialties of ornamental growers.

Plantings of European poplar have been affected by canker.

The second category requested we cannot supply too much information about. The list in the paragraph just above includes the X-disease of peach and the fruit rot of strawberries, both diseases having assumed proportions where crop plantings might be affected, but the controls have been provided in advance of any necessity for reducing the crop. Blue mold of tobacco in Connecticut is in a similar category.

We have never suffered from a shortage of potatoes, but certainly the acreage of potatoes, and the production per acre has increased as a result of developing better insecticides and fungicides spray program. DDT and Dithane are primarily responsible for this situation in Connecticut. CONNECTICUT AGRICULTURAL EXPERIMENT STATION, NEW HAVEN

IDAHO

By C. W. Hungerford

In about 1920 when I first came to Idaho there was a sugar beet factory located at Nampa in the southwestern part of the State. The factory closed due to the fact that sugar beets could not be grown successfully in that area because of hazards due to the curly top dis-

ease. Through the combined efforts of the U. S. Department of Agriculture and the cooperating States, several beet varieties have been developed which are resistant to curly top. A new million dollar factory was built at Nampa and another was built at Nyssa, Oregon, just across the line from Idaho. Both of these factories have been operating to full capacity and this has all been made possible by the development of curly top resistant sugar beet varieties.

When I came to the State the field beans in southern Idaho were almost 100 percent infected with common mosaic. In 1925 we began a program of bean improvement and since that time, have developed selections and varieties of all the common field beans which are resistant to common mosaic and to curly top. This improvement program has not only stabilized the industry but has allowed field beans to be grown in many areas where it was impossible to grow them successfully before due to curly top. All the field beans certified by the Idaho Crop Improvement Association are numbered University of Idaho introductions.

Bacterial wilt in alfalfa appeared in southern Idaho in the irrigated section, especially in the southwest and south central areas, and developed rapidly until it was impossible to keep stands of alfalfa more than 3 or 4 years. Previous to the time the disease appeared, many fields were left in alfalfa for 12 to 15 years. This disease changed the program of crop rotation, interfered materially with certain live-stock types of farming and reduced the total acreage of alfalfa quite materially. The development of resistant strains of alfalfa is solving this problem.

The vegetable seed industry has, through the years, been forced to move the growing of vegetable seeds due to losses from plant diseases. The bulk of the vegetable seed of the United States is now western-grown; a very large percentage of it in the State of Idaho. Some seed companies have grown infected seed in the West in order to free this seed from seed-borne diseases. Efforts have been made through the years to protect this area from the introduction of those diseases which might cause severe losses under our growing conditions. Infected roots of carrots and other vegetable crops have been shipped into the State, and in the case of carrots bacterial blight and aster yellows have been introduced. One area near Caldwell, Idaho, discontinued the growing of carrot seed because of losses due to these diseases. A method of seed treatment has been developed by the Plant Pathology Department which has proven successful in controlling bacterial blight. A program of control for aster yellows has also been developed. UNIVERSITY OF IDAHO, MOSCOW

ILLINOIS

Benjamin Koehler

In Monroe County the hazard of growing a crop of either red or sweet

clover has become so great that the farmers have just refused to grow it any longer. That, of course, is very important from the standpoint of keeping up soil fertility. As a result of this pressure from him and, to a lesser extent, from a number of other farm advisers in that general area, we employed Dr. J. W. Gerdemann on September 1 to work on legume diseases.

During November corn spoiled in the cribs in northern Illinois. The two main causes of trouble seem to be too early harvesting and inadequate facilities for proper cribbing. We are told that many farmers were through harvesting by November 1, whereas they should not have started until after that date. The yields were unusually high and farmers not only overloaded their regular corn-drying cribs but also constructed temporary cribs. After filling the regular spaces in the usual double cribs they proceeded to fill the driveway also. This, we are told, is true probably in the majority of farms. Temporary cribs were made from snow fences and were usually too large in diameter. We have also had an unusual amount of warm damp weather this fall. All of this together is causing a good deal of spoilage.

None of the corn in northern Illinois is dry enough for farmers to be able to get a federal loan on it. Some cribs are actually hot and steaming, and in some cases farmers have unloaded those and taken the corn to elevators at a price of only 35 cents per bushel. The weather has now turned cold enough to check spoilage except in those cribs which are generating their own heat. There are companies that make portable drying units for farm use, gasoline heated with blowers run by electric or gasoline power. All available equipment of that kind, we understand, has been purchased and is in use in that area.

Reports of this spoilage have come from Stephenson, Carroll, Boone, Ogle, and McHenry Counties. A check made by some of the federal grain men indicated that the moisture in the cribs in that general area ranges from 24 percent to 36 percent whereas only 20 1/2 percent is allowable for federal loans. UNIVERSITY OF ILLINOIS, URBANA

MAINE

By Donald Folsom

The present hazards include both new and old disease problems. Potato bacterial ring rot became a new disease in the early thirties. It is being controlled quite well through a zero tolerance in certified seed and by sanitation and disinfection. Leafroll with its resulting net necrosis first became severe in Aroostook County in the 1937 crop and has resulted in considerable displacement of the Green Mountain variety by the Katahdin variety. Control is being effected through use of Katahdin, which is somewhat resistant to leafroll and immune to net necrosis, and

through foundation seed plots and the Florida winter test. Blackleg and late blight have remained as more or less hazards although control has been advanced by proper handling of the seed in the case of blackleg and by the elimination of many dump piles in the case of late blight. The use of top killers has helped to control leafroll and late blight but has introduced a new difficulty, vascular discoloration.

Under revival of crop industries might be mentioned the improvement in the available potato seed stock through foundation seed plots, the Florida test, and possibly the use of DDT.

Results of Florida Winter Tests of
Maine Potato Seed Stocks, 17 Varieties, 1939-1947*

<u>Crop year</u>	<u>Samples tested</u>	<u>Samples good enough to recommend stocks</u>
	<u>No.</u>	<u>%</u>
1939	215	56
1940	210	49
1941	396	55
1942	403	50
1943	609	66
1944	971	27
1945	1218	44
1946	1551	80
1947	1555	81

*Most improvement in 1946 in Chippewas, least in Katahdins which were already good in previous years. Other leading varieties (Cobbler, Green Mountain, and Sebago) showed intermediate improvement. Chippewas in previous years were hurt by leafroll.

MAINE AGRICULTURAL EXPERIMENT STATION, ORONO

MASSACHUSETTS

By Oran C. Boyd

Revival of Crop Industries: Since the arrival in recent years of virus-resistant raspberry varieties on the market, considerable interest has been revived in commercial raspberry growing in this State, and also in the growing of nursery stock within the State.

Changes in Crop Industries: The large acreage of seed onions in the

Connecticut River Valley of a few years ago has nearly disappeared, and has been partially replaced by raising of set onions, due to the losses from "blast" and thrips.

As a result of the development by C. V. Kightlinger of black root-rot resistant strains of the Havana seed tobacco variety, at least half of the acreage now devoted to Havana tobacco in this State is planted to No. 211, K1, K2 or K3.

Owing to the objections by potato buyers and users of net necrosis discoloration in Green Mountain potatoes raised in high elevation sections of the State, the acreage there formerly devoted to Green Mountain has shifted almost entirely to varieties that do not develop net necrosis, mostly Katahdins.

A new attitude of encouragement is being assumed by commercial vegetable growers toward the growing of head lettuce since the discovery of a sure practical way of controlling the Aster Yellows disease (with DDT for the vector leafhopper).

As a result of the destructive nature of Peach X-Disease, considerable interest has been lost in the past 10 years in commercial production of peaches.

New Disease Problems: Our carnation growers are becoming deeply concerned about the Bacterial wilt disease of carnations, which was introduced apparently in recent years. Information is needed on the distribution, seasonal behavior and control of that disease.

There is a growing belief that at least some phases of the root-rot diseases of tobacco in this State are attributable to members of the meadow nematode group. Information is badly needed on the prevalence of black and brown root-rots in relation to kinds and abundance of nematodes, soil types, etc., as well as on the control of harmful nematodes in tobacco-soils. UNIVERSITY OF MASSACHUSETTS, AMHERST

MINNESOTA

By R. C. Rose

A few cases where a crop program has been affected by diseases are listed below:

Aitkin County some years ago had a thriving business in raspberry production. Mosaic disease was largely responsible for its being almost eliminated today. Very few plantings are left.

Dodge County once led as a cabbage producing county. Today the county's commercial production is gone. Reason: black rot and blackleg mostly.

The cabbage industry of Carlton County only a few years ago was on the way out like that of Dodge County, but instead adopted hot water seed treatment and a sanitation program and the industry has survived and is growing.

A few years ago Phoma rot in rutabagas was taking heavy tolls in Pine County and farmers were planning to drop this crop. Disease control methods have stabilized production on this important cash crop for which the county is famous.

In recent years many potato farmers have dropped potatoes owing to losses from ring rot.

Many vegetable growers around Duluth, St. Paul, and Minneapolis have ceased to grow cabbage because of soils contaminated with club root.

Pickle companies in Minnesota have moved their field of operators a number of times after farmers lost interest in the crop because of falling production especially after epidemics of mosaic disease.

In southern Minnesota the barley acreage has fallen rapidly during the war years. Root rot and low yields rather than market price were the cause.

Had it not been for the new varieties of oats that resist Victoria blight, the oat acreage would have receded greatly in the last two years. UNIVERSITY OF MINNESOTA, ST. PAUL

NEBRASKA

By Arden F. Sherf

Throughout the years, Nebraska has had certain agricultural areas which have shifted crops due to disease difficulties. We have one area in western Nebraska in Scotts Bluff County in which potato scab has become so serious as to have prohibited commercial production of the Bliss Triumph, which is our most common variety. The only potatoes grown in this area are of the russet type which have more resistance to this disease.

In addition to this instance, I might mention a small area in Sioux County and another one in Cheyenne County which formerly grew a considerable acreage of potatoes, but in recent years the soil-borne Fusaria have become of so much importance that potato production has become of minor importance. There have been other instances of threatened crop destruction in specific areas such as Bacterial wilt of alfalfa which has been controlled by the development of resistant varieties and more recently Victoria blight of oats for which resistant varieties have also been the answer. UNIVERSITY OF NEBRASKA, LINCOLN

CHANGES IN CROP INDUSTRIES IN NORTH DAKOTA
CAUSED BY PLANT DISEASES

By W. E. Brentzel

Crop diseases often have brought about changed plans and practises in North Dakota. Sometimes the cause of these changes may or may not be known since growers automatically change when profits cease. In many cases the cause for the changes are known to be diseases and a few instances may be cited:

Grain rust epidemics have frequently caused local, if not regional, changes in production. In the years 1904 and 1916 major losses in the grain crop occurred and seriously threatened the industry. Other serious rust epidemics occurred at frequent intervals since 1916, one as late as 1935. By changing to rust resistant varieties and by eradicating the barberry bushes the industry was saved. Pathologists have had a major part in the work of developing these varieties of wheat and other grains and in the destruction of barberry bushes. This work has added untold wealth to our country as a whole.

The flax wilt problem paralleled the cereal rust problems in respect to time. This disease, it appears, chased flax production almost out of the U. S. The flax crop followed closely on the opening up of new lands. After a few crops of flax had been taken, the land became infested by the wilt fungus, resulting in the abandonment of flax-growing and the substitution of some other crop. When the new lands became scarce flax production moved out and for a number of years the crops survived only in the northwestern prairie States, largely in the Dakotas and Montana where grass lands could be found. It was not long until even these regions of new land ran out and something had to be done to save the flax industry. It was necessary to demonstrate the cause for the wilt of the crop and and to develop control measures. This creditable work was done largely by one of the earlier pathologists, Dr. H. L. Bolley. The cause for the wilting was shown to be a fungus, Fusarium lini [F. oxysporum f. lini], and the methods for control were subsequently developed. Through the efforts of this man and without much assistance we may say that the flax industry was saved. Since the details for control have been worked out the methods seem simple enough. At present the grower of flax may be assured that the crop will not be destroyed by wilt.

Since 1940 the flax industry again ran into trouble. Certain high yielding varieties of excellent quality were introduced to growers. Because of the merits of these varieties it was not long until they were selected for a large portion of the flax producing area. Although susceptible to one "minor" disease, pasmo, they were resistant to the major diseases, wilt and rust. Unfortunately the minor disease pasmo did not

remain insignificant. Growing these varieties over large areas resulted in the building up of the pasmo fungus Septoria linicola [Mycosphaerella linorum], and after a few years so much of the fungus was harbored about the land that the entire flax acreage was threatened. The disease was promptly recognized by pathologists in its new role of large scale destruction. Since this experience all varieties that are susceptible to the pasmo disease have been replaced by resistant kinds.

A number of minor crops may be cited as other examples. During the drier years the tomato crop was threatened by the fungus Septoria. While we were having the difficulties with this disease in tomatoes the flax crop was being seriously damaged by the pasmo disease. This fungus has a wide range of hosts and it appears that it may have included the tomatoes and a few other minor crops in its role of destruction. While this may not be entirely true, circumstantial evidence points strongly in this direction. Since pasmo resistant varieties of flax have replaced the susceptible kinds we have not noticed very much Septoria infection on tomatoes and other crops.

Other minor diseases that seem to have potential greatness are the loose smuts of wheat and barley. The favored varieties now, unfortunately, are susceptible to these diseases. In a few local areas growers have become very much concerned over losses from loose smut. Up to the present time this is one of the problems that has not been satisfactorily solved.

The potato industry is constantly confronted with new disease problems resulting from the introduction of new seed lots into our State. In 1920, about the time when the potato industry began its development in North Dakota, there were relatively few diseases prevalent in this region. Today, on the contrary, there are relatively few diseases that do not exist here, having been introduced almost entirely by importations of new seed lots. At the present time the potato industry in this State lies about 90 percent on the shoulders of plant pathologists. Without disease control and regulation this perishable crop certainly could not exist very long. By the introduction of new control measures (including new chemical sprays), by careful selection of seed stocks and elimination of diseased lots, and by the development of new varieties resistant to diseases, the potato industry is able not only to thrive but to increase at a comparatively rapid rate. NORTH DAKOTA AGRICULTURAL EXPERIMENT STATION, FARGO

OREGON

By J. R. Hardison

Blind Seed Disease. In Linn County there are a number of farmers whose livelihood depends almost entirely upon perennial ryegrass seed produc-

tion. In some cases practically no income was realized for a year, because the seed produced was unsalable due to blind seed disease. In other cases, infested fields have been sold to unsuspecting new owners who could not sell subsequent crops. I have no information of loss of farms, but several farmers are in questionable financial straits because crops were not as good as anticipated. Mr. Mikesell may have these records for Linn County. Certainly the perennial ryegrass farmers' lives have been changed because successful seed production now depends on practice of effective control measures. The Linn County planning commission recognizes blind seed disease control as the critical operation in perennial ryegrass seed production.

Ergot. Ergot is apparently responsible for considerable sickness and occasionally death of livestock, especially sheep in the Willamette Valley during the fall months in perennial ryegrass pastures.

Grass Seed Nematode. This disease is the critical problem affecting seed production of chewings fescue, astoria bentgrass and seaside bentgrass. Effective control measures are available for chewings fescue but not for the bentgrasses. Losses of 50 percent of the seed crop are not uncommon.

Grass seed nematode galls are recognized as toxic to sheep, cattle and horses. Many fatal cases have resulted from feeding nematode gall infested screenings from chewings fescue seed crops. OREGON AGRICULTURAL EXPERIMENT STATION, CORVALLIS

PENNSYLVANIA

By R. S. Kirby

From our experience, the most striking example was the chestnut blight which nearly completely destroyed the chestnut crop of timber and nuts.

Another example would have been stem rust on oats in the northern part of the State. Stem rust was so severe in many of the northern Pennsylvania counties that the farmers practically gave up growing oats in the late 1920's and early 1930's. Barberry eradication was started about 1935 and as soon as the barberries were removed, oats production immediately came back and was a very important crop in this whole area, which is largely devoted to dairying. A careful study made on 168 farms where oats were grown and where varieties, fertilizers, or other cultural practices had not been changed showed that for the five years before barberries were eradicated the average yield was 17.4 bushels an acre. For the five years following barberry eradication the average yield was 39 bushels an acre.

In raspberry production, mosaics, leaf curls and anthracnose have

practically driven raspberries out of the small garden and farms of the small growers and in many cases off the farms of the larger growers. If these diseases could be controlled raspberry production would be three to five times the present yield. Those growers who do practice measures to control these diseases have been very successful.

Helminthosporium blight on oats caused crop failures or heavy losses where the varieties Vicland, Tama, and Boone were grown. If resistant varieties had not been available, this disease was well on its way to driving oat production out of Pennsylvania.

On tomatoes and potatoes, late blight would, in certain years, ruin the crop and discourage many growers from further production if it were not for the control programs. The reduction in acreage in both potatoes and tomatoes comes largely from the small grower who is not equipped to spray. On potatoes, ring rot has been a threat as great as or greater than late blight. If it had not been for the finding of resistant varieties and the development of effective control measures many growers were so discouraged that they would have gone out of the potato business.

Smuts of oats, wheat and barley have at times seriously threatened the continued production of these crops. Only the adoption of control measures has made it profitable for growers to continue production.

PENNSYLVANIA STATE COLLEGE, STATE COLLEGE

TEXAS

By A. A. Dunlap

Following are some observations that I have made since being in Texas and some reports of serious plant disease instances that have been handed down from other years.

I have been told of an attempt made several years ago to start a pear industry in the Gulf Coast area below Houston. It seems that this attempt failed due to the severe epidemics of fire blight which ruined the orchards.

About four or five years ago large farming areas in Zavala County were abandoned by spinach growers because of the high incidence of white rust nearly every year.

Growers of Irish potatoes in the Texas Panhandle areas, particularly in Floyd, Deaf Smith, and Dallam Counties, found it impossible to raise late summer and fall crops of potatoes owing to the severity of early blight at that time of the year. They confine their crops now entirely to plantings that can be made as early in the spring as possible.

A rose grower in Tyler once told me of a nurseryman who attempted to raise rose plants in Wilson County and was forced to abandon his business there due to the prevalence of crown gall. We suspect that the crown-gall organism may be sort of native in some of our Texas soil types.

Up until the time some resistant strains of oats and wheat have been developed, it has been impossible to raise these small grains in any of the South Texas area due to the prevalence of leaf rusts.

It was once reported to me that originally there was a packing shed for tomatoes here in Bryan but the green wrap tomato industry was abandoned here apparently due to some disease like southern blight.

We have had many cases of cotton farms that were abandoned apparently on account of prevalence of cotton root rot in the fields. AGRICULTURAL AND MECHANICAL COLLEGE OF TEXAS, COLLEGE STATION

TEXAS

By P. A. Young

In 1945, some of the farmers who bought slip tomato plants from the Lower Rio Grande Valley of Texas had the misfortune to get plants that were infected with Phytophthora infestans. Cool rainy weather followed transplanting of these tomatoes into fields near Jacksonville, and late blight became epidemic. It not only destroyed the tomato plants from the valley but also spoiled the tomato seedlings in the hot beds and cold frame near them. Two of the farmers quit farming after the failure of their tomato crops.

Near each farm in this region, there is one patch of ground that is most convenient for a garden, and these patches have been used for gardens for many years. Sooner or later, these patches (gardens) become infested with root-knot nematodes that decrease yields and quality of many garden plants thereafter.

Tomato slips from the Lower Rio Grande Valley brought Verticillium wilt into at least four tomato fields in Cherokee County in 1947. These were the first records of this disease in this part of Texas.

Blossom-end rot of tomatoes often is very destructive here. About 1938, a farmer in one community lost nearly his whole crop of tomatoes because of blossom-end rot. Faulty use of fertilizer seemed to be the main explanation. I discussed the problem with him in his field at that time. He has since then been a very successful tomato raiser.

In 1948, two farmers tried fields of Grothen Globe tomatoes. They lost at least half of their tomato crop due to the damage from blossom-

end rot in this very susceptible variety.

Bacterial spot (nailhead rust) is the epidemic disease of tomatoes in this region. In rainy weather in May and June, this disease destroys the crops in many fields of tomatoes.

In 1941 from June 10 to June 20, Alternaria solani spread like a prairie fire, with the aid of a few warm rains to spread the spores. Early blight destroyed at least half of the tomato leaves in about 5 counties in and near Cherokee County, Texas. The tomato sheds closed in surrounding counties, but farmers in Cherokee County had dusted or sprayed their tomatoes with copper enough so that they finished selling their crops in Cherokee County. This is the only major epidemic of early blight of tomatoes that I have seen. TEXAS AGRICULTURAL EXPERIMENT STATION TOMATO DISEASE LABORATORY, JACKSONVILLE

WEST VIRGINIA

By J. G. Leach

Because of the nature of agriculture in West Virginia, we do not have many specialized crop areas where diseases have strikingly changed or limited crop production.

The most outstanding example of a disease hazard is that of watermelon wilt. Up until about 20 years ago, there was a fairly extensive area of watermelon production in the western part of the State along the Ohio River in Mason, Jackson and Wood Counties, but this has largely been eliminated due to the ravages of Fusarium wilt.

I also know from observation of one other small area in the vicinity of Buckhannon, West Virginia. Here an attempt was made to grow strawberries on a commercial scale. A black root rot of uncertain cause has been a decided limiting factor in the development of this industry.

Some commercial tomato growing industry has developed in Morgan County. This industry was seriously threatened by late blight during the past 6 or 8 years and it was saved only by the organizing of spray rings under the direction of our Extension Plant Pathologist.

In the Canaan Valley there was an attempt to establish head lettuce production but within two years after the start of commercial production there, before the acreage had exceeded 25 acres, the widespread occurrence of aster yellows proved a limiting factor and there probably will not be much further development. WEST VIRGINIA UNIVERSITY, MORGANTOWN

WYOMING

By G. H. Starr

You have asked for information on changes in crop industries in this State caused primarily by plant disease and a revival of crop industries due to the development of disease control methods.

To the first part, I think of one example in Wyoming. This change was due to the presence of Fusarium wilt (eumartii) in a small area south of Torrington in central eastern Wyoming. This was a dryland area where several growers quit the potato industry in about 1932-34 and switched to the growing of wheat. Fusarium wilt was very prevalent and I have observed it as high as 75 percent in some of those fields.

To the second portion, I think also of one example. This is the revival of the potato industry near Powell, in the northern central portion. This area used to produce approximately 1,000 cars, however, in the year 1935 or there-about, this area was practically out of the potato industry primarily because of the prevalence of psyllid yellows and ring rot in potatoes. Now, with known methods of control and the application of them, this area is gradually coming back into potato production, although it will be some years before they get back to the one-time peak production.

UNIVERSITY OF WYOMING, LARAMIE

II. EFFECTS OF LOSSES FROM PLANT DISEASES ON FARM LIFE

Reports from County Agents

1. EFFECTS ON GROUPS OF FARMERS

1920-1940

Granville wilt of tobacco was discovered in Granville County, North Carolina, 30 or 40 years ago. About 7000 acres of tobacco were grown on 1500 farms in the southern half of the County. The farm families had owned and operated the farms for generations in some cases. The disease destroyed 20 to 50 percent of the crop each year; the loss amounted to from 1 to 2 million dollars annually, depending on the price of tobacco. Crop rotations, land sterilization, a variety of chemicals etc., were tried in attempts to control it. A great number of farmers lost their farms. Those who were able to keep theirs did patch farming, trying to select land free from wilt. The farmsteads deteriorated. Many farmers became irritable and noncooperative. Education was neglected; hundreds of boys and girls failed to get college educations because of this disease. Standards of living and health dwindled to a low ebb. A wilt-resistant tobacco finally was developed, but it took more than 20 years of research. Remarks: Loss from forced sale of farms at sacrifice and the loss from tobacco sales amounted to from 30 to 40 million dollars from 1920 to 1940. --C. O. Morgan

1935

Stem rust caused practically complete loss, in the majority of cases, on about 700 wheat farms in West Polk County, Minnesota. The average yield expected was 20 bushels to the acre, whereas none at all to 50 percent yields were obtained. Thousands of acres were burned. The total loss was about \$400,000. Some farmers had to quit. Many took five to seven years to recover because wheat was the main crop at that time. The loss stopped all progress in family living standards. -- Carl T. Ash

1940-1948

Nematodes and Phymatotrichum root rot caused loss in farm and garden land in Andrews, Crane, and Ector Counties, Texas, including 600 acres of truck crops and gardens and 11,000 acres of cotton. Loss averaged 50 percent, amounting to \$35 per acre. Three-quarters of a bale of cotton per acre was the expected yield, whereas one-third bale was harvested. Living standards were lowered and no improvements were possible. Remarks: Soil treatment with dicloropropane-dichloropropene was used to control nematodes; grain sorghum was planted on land infested with cotton root rot organism. Truck crops have been discontinued; only

small garden plots where the soil can be treated on a small scale are planted now. Farming is mostly grain sorghum in this area. Very little cotton is grown because of cotton root rot. Four-year rotations have helped farmers to recover financially. -- Alton E. White

1946-1947-1948

Ten to fifteen thousand acres of cantaloupes and honeydew melons in Imperial County, California, have suffered heavy loss from cantaloupe mosaic each year. The disease has been common in all plantings since 1946. To control it growers have tried various cultural practices, and used all new and established aphicides to control the green peach aphid. Of the expected 150 to 160 crates per acre, only 90 to 93 were obtained. The whole melon industry is seriously affected and some of this operation is being transferred from this area. Other growers have stopped growing melons. This is a serious economic loss which affects most people in this area -- many groups besides farmers, including laborers, shed crews, and general business. -- John E. Swift

1948

Wheat smut (covered smut) has caused heavy losses on 1208 farms totaling 40,000 acres in Union County, Oregon. The farmers followed good farming methods and had owned their farms for periods of 10 to 40 years. The disease is common and has been increasingly severe. Farmers have used seed treatment to control it. The loss was estimated at 13 percent; the average expected yield was 37 bushels whereas 32 bushels was harvested. The total loss for the county amounted to \$380,000. Reduction in farm purchasing value affected farm equipment and family necessities. To recover from the loss required going without some of the necessities. -- R. W. Schaad

Cumulative

Six to seven thousand acres growing peas in Imperial County, California, suffered loss from root rot, which was common on repeatedly cropped land. To control it farmers plow under Sudan grass and make large applications of Areo-Cyanamid and soil treatment chemicals. No loss of farms has resulted but yield is low and income is poor. Because of the root rot, many acres are planted to crops which bring smaller incomes than peas. The overall family income is reduced in some areas. Remarks: Although this disease has not been sensational in its effect it has gradually caused a reduction in pea acreage in this area and a resultant loss in income from a large cash crop. -- John E. Swift

There is a serious sweetclover disease situation in Monroe County, Illinois, at the present time, but losses resulting are not specific enough to cause farm foreclosures. The disease seems to have built up

where sweetclover has been grown in rotation for a considerable period, since it is not so severe on soils seeded to this crop for the first time, even though the soil might be low in fertility. Therefore, production of farms on a low fertility level might not be so badly affected as that of more fertile farms. We have been worried about this situation for several years. Sweetclover has made Monroe County, and this disease if not controlled, will un-make the County more rapidly than it was made. Instead of an individual bankruptcy, we will be heading for a county bankruptcy, so to speak, if the problem is not solved. We are changing to alfalfa as quickly as is practical, but in a cash grain area that cannot be done very readily. The \$64 question in Monroe County during the last few years has been, "What are we going to do about sweetclover failures?" The common expression sums it up: "When we first started growing sweetclover, it got as high as a horse's back, and now it won't hardly hide rabbits!" -- Edgar S. Amrine

2. EFFECTS ON INDIVIDUAL FARMERS

1914-1918

The farmer was the life-time owner of an average-size farm in Lake County, South Dakota. Leaf and stem rusts caused loss to small grains. Barley yield was reduced from 30-50 bushels per acre to 10-20, oats from 40-60 to 5-15, wheat from 20-30 to 2-5. The loss amounted to \$1000 to \$3000 per year. Two sons worked their way through college with very little help from home. Money was borrowed during this time of crop failure, and low farm prices on top of this loss caused foreclosure of the home farm when the depression was at its worst, in 1934. The sons went into other work. Remarks: At that time no control methods were known. Before plant pathologists and breeders were able to develop new disease-resistant varieties it was a "plant and hope" proposition. If weather was not conducive to plant diseases a crop was raised. If it was damp, foggy and muggy usually a very heavy loss resulted. Crop diversification, corn, alfalfa, and pastures saved the day for most farmers. -- Harmon Boyd

1917-1930

The farmer-owner had operated his 200-acre farm, large for the region, in Watauga County, North Carolina, for several years. Club root, a comparatively recent introduction to the area, caused heavy loss to cabbage. Usually 25 to 75 percent of the crop was destroyed. The farmer was forced to change his crop rotation, growing cabbage on high land that was less productive. He suffered a reduction in income that resulted in a lower standard of living. He finally recovered from his loss, but it took ten years or longer. Remarks: The disease appeared in this section about 1910, but did not become serious until after the flood of 1916, which spread the organism over creek and river bottoms; by further movement

with farm machinery from field to field the disease soon became widespread. For a few years following 1916 it was severe. The grower stated that in 1923 he cut 300 pounds of cabbage from one seven-acre field where he was expecting a yield of approximately 140 tons. After this he turned to less desirable cash crops and more livestock. Neighbors said that for several years he had rather a fight to hold his farm, but the farmer himself will not admit it. -- L. E. Tuckwiller.

1920-1948

Phymatotrichum root rot caused 25 to 50 percent loss to alfalfa on a farm in Wichita County, Texas, operated by the owner for ten years. The yield was only 2 tons per acre, whereas 5 tons had been expected. The loss amounted to \$60 per acre. Lowered income resulted in less education for the family. Hubam clover was planted in an attempt to overcome the loss, but the farmer has not yet recovered completely. -- J. M. Carpenter.

1928-1935

Apple scab caused heavy loss on a 70-acre farm, small for the region, in Snyder County, Pennsylvania. The farmer had owned it for 20 years. In 1928 he sprayed with materials not recommended by the College, and lost 80 percent of his crop. From 1500 bushels expected yield, he got 300 bushels of poor quality. The trees were weakened so much as to affect future crop years' production. Succeeding drought years, in 1930 and 1932, killed outright 15 percent of the trees weakened by the disease attacks. The orchard has never completely recovered from the damage. Extensive annual borrowing has been necessary ever since, to produce the crop. The loss seriously affected the financial stability of the family (man and wife, no children), and caused the man to seek another job. He is now working full time in a welfare institution. The farm is mortgaged and liened to such an extent that the owner would be glad to sell for the amount of indebtedness. Remarks: Whereas this orchard had been a debt-free enterprise, it is now so very heavily tied up in financial obligations as to affect the crop production question. There is no longer any independence of thought and action by the operator. -- Ira L. Yoder

About 1930 and 1931

The tenant, a good farmer, had operated an average-size farm in Pinal County, Arizona, for two or three years. Three hundred acres of lettuce were grown. Watery brown rot had appeared in the region one or two years previously. No attempts were made to control it; the disease was new and after diagnosis no control method was known. The crop loss was 90 percent; 25 packed crates or less were obtained out of an expected 250 packed crates per acre. Some lettuce that appeared to be all right in the field was discarded at the shed. The loss involved an estimated \$40 an acre in growing costs, and \$250 per acre in anticipated profits.

There were no effects apparent in the family standard of living. The operator took his loss and moved to another county where he farmed and handled cattle. Later when he ceased farming operations he sold his farming equipment, and since that time has engaged in a range livestock business, apparently quite successfully. -- K. K. Henness

1932

A farm in Marion County, South Carolina, with 90 acres of cropland, had been farmed by the owner, a good farmer, for 50 years. Flue-cured tobacco was grown on 15 acres. Blue mold appeared in 1932. The farmer tried to control it by spraying with copper sulfate, but the disease caused loss estimated at 70 percent due to seedbed damage resulting in unthrifty plants and delayed transplantings with consequent poor growth and small yield. The yield obtained was 300 pounds, out of an expected 1150. The loss amounted to \$2500. Purchase of needed farm machinery was delayed; standards of living lowered; one son was prevented from entering college. By following new methods of control, the farmer recovered financially after six years. -- D. Austin Shelley

1934-1936

A 165-acre farm in Montgomery County, Iowa, had been farmed by the owner for eight years. Barley scab caused trouble; the disease was fairly common in the area but was new to this farmer. Approximately 33 or 34 bushels per acre was expected, but the average yield of scab-free barley for two years was 8 to 10 bushels. The loss amounted to about \$15 per acre each year for the two years. The crop was grown for sale and for feeding, the latter causing most loss. Three calves were lost from feeding scabby grain. Family living standards were lowered; less money was available for necessities, and luxuries too. It took two years to get over this loss. Remarks: This man was weakened financially owing to the depression. -- S. L. Dunn

1935

Stem rust caused complete loss in 165 acres of wheat on an owner-operated farm in Lac qui Parle County, Minnesota. The loss amounted to \$4000. The mortgage was foreclosed; the family suffered a lower standard of living. The farmer only partly recovered his former status. Remarks: Wheat rust on this farm in 1935 was the final factor in the foreclosure, although not the only thing that brought it about. In some other instances in 1935 loss from rust to wheat and barley made foreclosure necessary: one was a 400-acre farm valued at \$16,000, with a crop loss for the year amounting to \$2000; another was 1100 acres, valued at \$25,000 with crop loss amounting to \$4000. -- Wayne Weiser

1937

The owner had operated a 320-acre farm in Traill County, North Dakota,

for 15 years. Stem rust caused heavy loss in 30 acres of Ceres wheat. Eleven bushels per acre were obtained out of an expected yield of 35 bushels. The loss, estimated at \$700 for that year, forced the owner to borrow money to carry on farming operations for the next few years, and created hardship in family life. It took three to four years or more to recover from the loss. Favorable crops helped in recovery.

-- R. L. Nelson

1938-1945

A tenant farmer had operated a 320-acre farm, small for this region, in Box Butte County, Nebraska, for eight years. Stem rust caused severe loss in wheat; only 6 to 8 bushels were obtained of an expected 18-bushel yield. The loss amounted to \$3300. Repeated poor crops prevented the operator from improving his financial standing and forced him off the farm. The family living standard was very poor. The man turned to other employment. -- J. R. Decker

1943

The owner had operated his 93-acre farm in Wood County, Texas, for 14 years. Black rot was severe in 19 acres of sweetpotatoes. The seed roots were dipped, but the soil was infested. Out of 2090 bushels stored 1650 were lost from this disease, amounting to \$1650. The financial setback took about three years to overcome. The family living standard was lowered materially for at least three years. Home repairs were delayed. -- E. A. Spacek.

1943 through 1947

The owner, a good farmer, had operated his farm in East Feliciana Parish, Louisiana, for 12 years. Blight caused heavy loss in 60 acres of common lespedeza. Seventy-five percent of the stand was destroyed; of the 12 bushels expected yield 2 bushels were obtained, amounting to \$60 loss per acre. Other enterprises on the farm offset the loss to some extent. The loss resulted in putting off the purchase of needed items that would improve living conditions. The farmer recovered by shifting to other crops. -- Farrell M. Roberts

1944

Anthracnose caused heavy loss on 35 acres of cotton grown on a 180-acre farm in Lawrence County, Alabama, operated by the owner for ten years. The loss amounted to \$1850; 325 pounds out of 500 pounds of lint expected were obtained. It prevented the purchase of needed farm machinery and home furnishings. -- S. P. McClendon

1945 through 1948

The farmer had owned his farm in Bennington County, Vermont, for

seven years. Apple scab and insects caused severe damage in his apple orchard, scab being the main cause of loss. The orchard was dusted for control, but the yield was only about 25 to 50 percent of normal. The farm orchard has not actually been lost yet but another crop failure will result in its loss. Living standards have been maintained at the expense of farm equipment and upkeep of orchard. -- Harry R. Mitiguy

1946

A tenant, a good farmer, had operated a large farm in Rockland County, New York, for three years. Late blight caused 70 percent loss in tomatoes; the average yield was 150 to 200 bushels per acre, out of 500 to 600 expected. Many fields were never harvested. The total yield loss was 30,000 bushels. Fresh markets refused green-packed tomatoes afterward. The loss amounted to \$40,000. Plans to build a farm home were delayed a year and a half. A good crop in 1948 brought financial recovery. -- William J. Clark

1946, 1947, 1948

A 90-acre farm in Caroline County, Maryland, had been farmed by the owner for 19 years. Late blight caused 60 to 75 percent loss in 10 acres of tomatoes. About 1 1/2 tons were obtained of the expected 6 tons per acre; amounting to approximately \$200 loss and preventing some desired repairs and the purchase of farm and home equipment. -- F. M. Rogers.

The owner, a good farmer, had operated his 145-acre farm in Wicomico County, Maryland, for 35 years. Anthracnose, leaf spot, and wilt were very destructive to 5 acres of cantaloupes, although dusts and sprays were applied for control. The loss was estimated at 95 percent; practically no yield was obtained. The farmer has not yet recovered from this loss. He grew corn, watermelons, and sweetpotatoes in 1948, but heavy rains prevented these from yielding an income of any amount and also favored anthracnose on the watermelons. If this condition keeps up, it may result in lower living standards. -- James P. Brown

1947

The farmer had owned his farm in San Joaquin County, California, for 25 years. Spotted wilt, for which there is no economic control, caused complete loss of crop in 40 acres of tomatoes; 18 tons per acre were expected, whereas no crop was obtained. At \$25 per acre the expected return was \$18,000; minus picking costs of \$7200, the loss amounted to \$10,800. The loss effected a reduction in capital and increased the amount of money borrowed to finance the next season's crops. It did not affect education or health as a profit was made on other crops raised, but did cause a reduction in things that might have been purchased to increase the standard of living. The farmer has recovered partially from this loss, but it will probably take him three or four good years to get back

to where he would have been if the crop had not failed. -- Jack P. Underhill

1947 and 1948

A 20-acre farm in Essex County, Massachusetts, had been farmed by the owner for 15 years. Apple scab caused 100 percent loss for two years. The farmer applied two pre-blossom sprays. Four thousand bushels was the expected yield, but 200 bushels were obtained. The loss amounted to \$4000, at least half of which was due to scab. The grower sought employment in industry after this combination of two successive poor crop seasons, due to the disease, poor pollination, etc. He had to work hard to make a living with these two short crops. He has only partially recovered his former position, by working in industry three years or more. Remarks: This is a typical case of smaller orchards during the past three years. Many have been abandoned because of crop failure and poor disease control. -- Calton O. Cartwright

The farmer had owned his farm in Rockland County, New York, for 28 years. Scab caused heavy loss in his 66-acre apple orchard. Instead of following the Extension Service spray service schedule, he planned a two-weeks' spray schedule. The loss was 85 to 90 percent: of the 8500 to 9000 bushels expected he obtained about 1000, and 40 percent of these were partly scabby. He lost a whole year's work, amounting to at least \$16,000. He had to reduce his help on the farm by two men. He had planned to buy a new sprayer and duster but was able to buy a fruit duster only. He needs a new tractor badly. His wife was forced to go to work in order to assist their daughter in college. It will take at least three good fruit seasons to recover from this loss. -- William J. Clark

1947-1948-1949

The owner, a good farmer, had operated an 80-acre farm in Volusia County, Florida, for 20 years. Black rot, a disease new to the region, caused 80 percent loss in 40 acres of cabbage, although the farmer attempted to control it by spraying. Only 6 tons per acre were obtained of the expected 30 to 40 tons. The loss amounted to \$3000 per acre. The farmer changed to cattle production and to other crops. Remarks: This is a sample of what happened to a dozen farmers in one area. Change of occupation and type of farming resulted. Some farmers reduced acreages and diversified. To date there have been no farm foreclosures. -- W. J. Platt, Jr.

1947-48, 1948-49

The farmer had owned his farm in Hendry County, Florida, for two years. Late blight caused complete loss in 50 acres of tomatoes, in spite of the use of Dithane. Three hundred bushels per acre was the expected

yield; none at all was obtained. The loss amounted to \$50,000. The farmer had to go deeper in debt to plant again. Remarks: Late blight is affecting the economy of our whole winter tomato crop each year. -- H. L. Johnson

1948

A tenant farmer had operated a farm in Greenlee County, Arizona, for one year. Phymatotrichum root rot caused loss of half the cotton crop on 40 acres, amounting to \$160 an acre. The farmer was forced to move to another farm to make a living. Low income resulted in low living standards. The loss has not yet been overcome. -- John L. Sears

The farmer-owner, a poor farmer, had operated his farm in San Joaquin County, California, for six years. Shot hole caused 90 percent loss in a 20-acre apricot orchard. The farmer failed to apply control sprays because of sprayer breakdown. Seven tons of marketable fruit were obtained, of the 70 tons expected, amounting to more than \$3000 loss. The loss of income forced the grower, his wife, and children to hire out as fruit pickers to make up the deficit. Living standards were seriously reduced, and the children's health endangered because of poor diet. The farmer has only partially recovered from this loss; recovery will take several years, if the farm is not lost. Remarks: It is very likely that this farmer may lose his land as a result of his loss. As his only possibility of earning a living is by his knowledge of farming, he will be forced to hire out as a farm laborer and likely will join the ranks of transient farm workers. -- Fred M. Charles

A tenant, a good farmer, had operated a farm in Spokane County, Washington, for three years. In spite of sulfur sprays for its control, apple scab caused complete loss in the 40-acre orchard. The loss amounted to \$5000. This was a cash rent agreement, and the renter was forced to give up this farm and move to another because of lack of income. He had sufficient other income to carry him through. Remarks: Apple scab was very serious to all our apple producers last year. There was considerable economic loss to many growers. -- H. L. Axling

1. *Le temps a été tout à fait normal, mais le vent a été assez fort pour empêcher l'atterrissement de l'avion. L'avion a été arrêté au bout de 100 mètres et a été décollé à 10h30. L'avion a été décollé à 10h30.*

2. *Le temps a été tout à fait normal, mais le vent a été assez fort pour empêcher l'atterrissement de l'avion. L'avion a été arrêté au bout de 100 mètres et a été décollé à 10h30. L'avion a été décollé à 10h30.*

3. *Le temps a été tout à fait normal, mais le vent a été assez fort pour empêcher l'atterrissement de l'avion. L'avion a été arrêté au bout de 100 mètres et a été décollé à 10h30. L'avion a été décollé à 10h30.*

4. *Le temps a été tout à fait normal, mais le vent a été assez fort pour empêcher l'atterrissement de l'avion. L'avion a été arrêté au bout de 100 mètres et a été décollé à 10h30. L'avion a été décollé à 10h30.*

5. *Le temps a été tout à fait normal, mais le vent a été assez fort pour empêcher l'atterrissement de l'avion. L'avion a été arrêté au bout de 100 mètres et a été décollé à 10h30. L'avion a été décollé à 10h30.*

6. *Le temps a été tout à fait normal, mais le vent a été assez fort pour empêcher l'atterrissement de l'avion. L'avion a été arrêté au bout de 100 mètres et a été décollé à 10h30. L'avion a été décollé à 10h30.*

7. *Le temps a été tout à fait normal, mais le vent a été assez fort pour empêcher l'atterrissement de l'avion. L'avion a été arrêté au bout de 100 mètres et a été décollé à 10h30. L'avion a été décollé à 10h30.*

8. *Le temps a été tout à fait normal, mais le vent a été assez fort pour empêcher l'atterrissement de l'avion. L'avion a été arrêté au bout de 100 mètres et a été décollé à 10h30. L'avion a été décollé à 10h30.*

9. *Le temps a été tout à fait normal, mais le vent a été assez fort pour empêcher l'atterrissement de l'avion. L'avion a été arrêté au bout de 100 mètres et a été décollé à 10h30. L'avion a été décollé à 10h30.*

